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ABSTRACT

This study of career patterns in teaching was conducted to provide insight into the development of careers within the teaching profession. The objectives of the study were: to describe the career patterns of a national sample of individuals from the high school class of 1971 (1,011 individuals surveyed during the period 1972-86) who were either trained for or entered the teaching profession; to describe teachers as to their self-reported background and education characteristics, teaching qualifications, teaching experiences, attitudes toward teaching, satisfaction with pay and with the profession; and to identify variables which predicted retention in the teaching field to 1986. Results suggest that the best predictors of teacher retention were human capital variables including the number of years in teaching, satisfaction with the job, teaching in a public school, number of continuing education activities, and number of education credits. Recommendations to policymakers include recognizing the importance of: (1) making teaching more professional thereby enabling individuals to have a larger investment in their careers; (2) wages and other economic incentives; (3) investing in teaching careers for women; and (4) offering flexibility for women who wish to get married or have children. (LL)

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National Longitudinal Studies of the High School Class of 1972

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Anne Hafner
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Office of Educational Research and Improvement NCES 91-470

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July 1991

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CAREERS IN TEACHING--FOLLOWING MEMBERS OF THE HIGH SCHOOL CLASS OF 1972 IN AND OUT OF TEACHING

HIGHLIGHTS

This report examines the career patterns of a nationally representative sample of 1011 individuals from the high school class of 1972 who were either trained for or who entered the teaching profession.

- For this group of teachers or potential teachers, six patterns of teaching experiences were identified:

  1) started teaching early, still teaching in 1986;
  2) started teaching late, still teaching in 1986;
  3) started teaching early, no longer teaching in 1986;
  4) started teaching late, no longer teaching in 1986;
  5) stopouts: moved in and out of the teaching profession;
  6) earned a degree and qualified to teach, but never taught.[1]

- Although about 55 percent of this teaching cohort were consistently teaching across a 10-year period (1977-1986), there was much mobility in these teachers' careers.

- Attrition[2] was found to be declining over time and to be almost nonexistent in this cohort in recent years.

- Between the school years 1984-85 and 1985-86, a large upturn in the retention rate[3] was found (52 percent to 61 percent). For these 2 years, the percentage of teachers in the cohort either starting for the first time or returning to teaching increased from 4 percent to 14 percent.

- A majority of teachers was satisfied with their pay and with their jobs.

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[1]See Pages 9-16 for detailed description of teaching patterns.

[2]Attrition: leaving teaching because of resignation, retirement, or death.

[3]Retention rate: the percentage of the 1972 high school graduates who ever taught who were in active teaching status for a particular year.

- For the time period 1978-86, the average annual attrition rate was 7.1 percent.

- For this same time period, the average annual percentage of teachers starting (including first starts or restarts) was 8.7 percent. This represents an average annual net increase for any starters or leavers (including returnees) of 1.6 percent (8.7 percent - 7.1 = 1.6 percent).

- The best predictors of retention in teaching in 1986, among those who ever taught, were

  1) teaching in a public school;
  2) number of years of teaching experience;
  3) positive satisfaction with job;
  4) number of continuing education credits;
  5) number of college credits in education;
  6) no children or few children; and
  7) low parental education.

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INTRODUCTION

As in any career, individuals enter and leave the teaching profession for many different reasons. A person who enters teaching to work with children may decide to leave the profession permanently for financial reasons or temporarily because of family responsibilities. At any given time, the teaching work force is composed of individuals from varied backgrounds and educational experiences who constantly make career decisions that affect on the makeup of the teaching corps and on the available supply of teachers. Some evidence characterizes teachers as having a great deal of mobility in and out of the teaching field. For example, according to one recent study, one-quarter to one-third of teachers who left teaching within 8 years of entry returned to teaching after an interruption (Murnane, Singer and Willett, 1988). In general, though, little is known about variations in teacher career patterns.

This study by the U.S. Department of Education's National Center for Education Statistics (NCES) attempts to provide insight into the development of careers within the teaching profession. The objectives of the study are the following:

1. To describe the career patterns of a national sample of individuals from the high school class of 1972 who were either trained for or who entered the teaching profession.

2. To describe teachers as to their self-reported background and education characteristics, teaching qualifications, teaching experiences, attitudes toward teaching, satisfaction with pay and with the profession.

3. To identify variables which predict retention in the teaching field to 1986.

This research study is unique in that it 1) uses a large, nationally representative and longitudinal database; 2) monitors the progress of a "new teacher" cohort over a long period of time: 1972-1986; 3) has high response rates to all five followup surveys; and 4) has detailed information on dates, types of schools employed in, conditions of employment, satisfaction, and measures of extensive personal history data going back to 1972, including high school experiences and achievement, course taking in postsecondary education, family formation patterns, work experiences, earnings and income, and selected attitudes and values.

The results of the study can be used by researchers, policy makers, and school administrators to address questions such as:

1. What percentage of teachers in a cohort enter and what percentage leave the teaching field each year over a 10-year period?

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2. What is the size and nature of the so-called reserve pool (those qualified to teach who do not teach) in a national cohort?

3. How satisfied is a cohort of teachers with their jobs and with their pay?

This study of career patterns in teaching is based on a large, nationally representative sample of approximately 1,000 individuals who were surveyed during the period 1972 to 1986. The sample represents approximately 239,000 1972 high school seniors nationwide who have taught elementary or secondary school or who were trained to teach but never taught. These 1972 high school seniors are drawn from a larger database: The National Longitudinal Study of the High School Class of 1972 (NLS-72). The NLS-72 sample represents the Nation's 12th-grade population of about 3 million seniors in more than 17,000 high schools in spring 1972. This is the first national survey of a cohort of teachers to include longitudinal data covering 14 years of educational and work experiences. This report uses this sample to study issues related to careers in teaching and teacher retention.

However, this survey report does not attempt to estimate a national attrition rate or to answer the question of whether there is, in fact, a teacher shortage. It covers only data for a cohort of 1972 high school graduates, and the patterns described may be unique to that particular cohort or age group.

Inferences regarding career patterns cannot be readily extended to other cohorts. This cautionary note is particularly important in making inferences about cohorts further distant in age from the 1972 high school class, because other factors may have affected older or younger teachers' decisions.

THEORETICAL BACKGROUND

Careers in Teaching

The study of careers in teaching has become an important national issue at the confluence of several strands of research: 1) teacher quality, 2) teacher supply and demand, and 3) attrition. A general concern with teacher quality has been a recent national phenomenon. From many corners of the Nation comes evidence that schools are becoming increasingly unable to attract and retain high ability college graduates as teachers. According to evidence, more able college students tend not to go into teaching (Chapman and Holzeman, 1984) and, among those who go into teacher training, more able students are more likely to switch to another career (Schlecty and Vance, 1981). The movement to professionalize teaching and to create a national teacher certification board has evolved out of these concerns.

Murnane, Singer, and Willett (1988) discuss what is known of the career patterns of teachers as they relate to teacher supply and demand. They note that quantitative research on teaching careers has been of two kinds: 1) estimation of attrition rates from one year to the next for teachers employed in a certain geographic area and 2) longitudinal studies of the careers of teachers who began teaching at the same time. They believe that most of the research has important limitations, including use of only two waves of data, use of only regional data, and lack of focus on which specific teacher characteristics determine persistence, leaving teaching or re-entering teaching.

They discuss the findings that resignations are most common during teachers' early years on the job and that survival rates for males and females differ (young women generally have the shortest terms). There is also a common finding of a U-shaped function of teaching experience: attrition is high among new teachers, low for quite a few years for experienced teachers, and high again as retirement age approaches.

As mentioned previously, current knowledge of teacher career patterns is inadequate, including how long teachers stay in teaching, how often they return and stay, and what incentives may induce them to stay in the field. The extent and nature of the "reserve pool" (the group of people trained in teaching or those who have taught who are not currently in the teaching force) is largely unknown.

Although NCES (Plisko and Stern, 1985) and others (Akin, 1985; PACE, 1986) have projected a teacher shortage, many questions persist about whether such a shortage truly exists, based on analyses done using only currently available data (Berryman, 1985; Murnane, Singer and Willett, 1988). In 1986, the National Research Council's Committee on Behavioral and Social Science and Education launched a project on the supply and demand for math and science teachers. The project found that too little data existed to formulate conclusions on teacher demand and supply in any area (American

Association of Colleges for Teacher Education, ERIC, 1986). In the most recent NCES *Projections of Education Statistics* (1989), projections on demand are presented, but because of insufficient data, projections on supply are not.

The Projections of Education Statistics to 2000 (NCES, 1989) projects that, according to a "middle alternative", an initial increase in teacher demand from 1989 to 1990 is followed by a decrease the following year. In the early 1990's, the demand for new hiring fluctuates somewhat, but in the latter part of the decade, gradual increases in demand is seen through the year 2000. The component due to turnover is the largest influence.

NEA (1986) maintains that the number of elementary and secondary students is increasing (also see *Projections of Education Statistics to 2000*, table 1, page 11). In addition, the percentage of college students who intend to major in education rose from a low point of 4.7 percent in 1982 to 8.8 percent in 1988 (Astin, 1989). Cavin (1986) estimates that only one third to one-half of entering teachers come from the source of new college graduates. Furthermore, estimates are that approximately one of every four students who completes a teacher training program never enters teaching or leaves within the first 5 years (Mark and Anderson, 1978 and Chapman and Hutcheson, 1982). These trends all impact upon the supply and demand of the teacher pool.

Theories on Teacher Attrition

According to the recent report of the National Research Council (1987), existing models of the teacher labor market do not provide reliable predictions of shortages or surpluses. Most models implicitly assume that the length of time spent in teaching is insensitive to salaries and other economic variables (Murnane and Olsen, 1987). Therefore, the National Research Council report (1987) recommends that research be carried out to look at the extent to which teachers' career decisions are sensitive to such variables.

A major problem with current attrition research is its failure to measure and categorize important subgroups of teachers who terminate employment (Grissman and Kirby, 1987). These data are needed to get better subgroup estimates in order to identify and evaluate policies and conditions effective in attracting and retaining teachers. In addition, little information is available on the career patterns of teachers and on attrition from teaching (Sweet and Jacobsen, 1982).

According to Grissman and Kirby (1987), current forecasts of attrition are weak and data on teachers and their attrition rates are inaccurate and unreliable. A constant 6 percent teacher attrition rate has been used by NCES for projecting teacher supply since 1969 (Frankel and Gerald, 1977), and attrition is now judged to be near its lowest level in 25 years. Although several current national surveys have the potential to be

used in estimating attrition rates (Census Bureau's Current Population Survey, NCES' Recent College Graduates Survey), such surveys generally have small teacher sample sizes, definitional problems or a lack of important variables which are needed in teacher attrition research. What is needed, Grissman and Kirby maintain, is a national information system that tracks teachers longitudinally. Major advantages to such a study include availability of nationally representative data, ability to track teachers across state lines, ability to determine who stays and who leaves, and measurement of multiple definitions of attrition.

In response to numerous calls for better national forecasts of teacher supply and demand and attrition rates, NCES fielded a large national Schools and Staffing survey of teachers, schools, and school districts in 1988. Early attrition is a major issue in this survey, as well as identification of the characteristics of the reserve pool of teachers. In a longitudinal supplement, samples of "stayers" and "leavers" were followed up in one year's time (1989). This survey will go a long way in filling critical data needs in this area. The first year's data may be available to the public for analysis in late 1990, and the longitudinal supplement data on teacher attrition may be available some time in 1991. Reports on attrition and other topics from this database will be released starting in 1990.

Chapman (1982, 1986) has developed a model of the influences on teacher retention. His model, which is grounded in social learning theory and Holland's theory of career choice, suggests that retention in the field is a function of a) teachers' personal characteristics; b) educational preparation; c) initial commitment to teaching; d) quality of first teaching experience; e) professional and social integration into teaching and f) external influences. These factors are theorized to influence career satisfaction which, in turn, relates to teachers' decisions to remain in or to leave teaching. Chapman tested his model using four groups of teachers: 1) those who taught continuously; 2) those who never taught; 3) intermittent teachers and 4) those who left teaching permanently. With a sample of 892 teaching certificate recipients who graduated from the University of Michigan in 1963, 1967, and 1971, Chapman carried out analyses to test differences among these four groups. Significant differences were found among the groups in a pattern which supported his model.

Chapman concludes that current work conditions, satisfaction, and factors such as family formation are important influences, and that the four groups responded to different incentives in formulating their career choices. He also found that career patterns were not related to teachers' academic achievement or to respondents' ratings of the adequacy of their teacher education programs, and that those who never entered teaching earned more than those who remained in teaching. Respondents who left teaching and intermittent teachers had much lower salaries than those who taught continuously. Changing careers had a price in this regard. Chapman also concludes that the roots of attrition go back to differences in initial career commitment and early work experiences. He stresses the importance of current work conditions and believes that

efforts to respond to a teacher shortage need to be carefully targeted to incentives most salient to particular groups (e.g. intermittent teachers).

Murnane and Olsen (1987) have recently developed a teacher attrition model based on an economic cost-benefit analysis framework, which also uses human capital theory. They believe that individuals in teaching constantly re-evaluate the benefits of continuing to teach relative to the benefits of other possible occupations and that salaries and opportunity costs influence teacher attrition. They theorize that during the first 4 years of teaching, when the amount of acquired human capital (amount of formal educational training, on the job training and intellectual qualifications) specific to teaching is modest, the decision to continue teaching is sensitive to salaries and working conditions and to expected benefits in other uses of time.

In a recent study using a large sample of individuals who began teaching careers in 1972, 1973, 1974, or 1975 in Michigan public schools, Murnane and Olsen calculated a person's "opportunity cost" in two ways: 1) as college major and 2) as average starting salary paid each year by business and industry to college graduates with that particular major.

The study found that teachers who were paid more stayed longer in teaching, that high school teachers were more likely to leave teaching than elementary teachers, and that chemistry, physics, and foreign language teachers had the shortest predicted duration. Opportunity-cost salary was also a significant predictor of duration in teaching: the greater the increase in starting salary teachers could earn in another occupation, the more likely they were to leave. Women aged 30 or less at the time of entering teaching stayed a shorter time than men or older women. In addition, there were differences in average duration for teachers who started their careers in different districts, even after controlling for salaries, subject area characteristics, and demographic variables. Only two characteristics of school districts were significant: residents' median education level was positively related to duration and percentage of black residents in a district was negatively related.

Murnane and Olsen (1987) conclude that salaries and opportunity costs influence teachers' decisions about how long to stay in teaching. Their model, however, explained very little of the variance associated with duration. It did not include academic ability or preparation measures, family formation variables, or important human-capital variables such as whether a teacher obtained an master's degree, number of education credits earned, whether a teacher is fully certified, and number of continuing education activities.

Heyns (1988) used the NLS-72 teacher sample to study attrition. She concluded that teacher turnover is higher than the low levels of attrition suggest, and that retention of teachers has increased during the last decade. In addition, she found that former teachers are more likely to have left "good" schools, rather than problem schools. She

found that 18 percent of experienced teachers re-entered at some point in their career, and that men were slightly more likely to leave than women. Her analyses were not multivariate, however, and did not include the influence of family formation, major field, or wage variables.

A model is proposed in the present paper which draws from both social learning theory (as advanced by Chapman's model) and from human capital theory (as used by Murnane). Background characteristics and early educational preparation, as well as social variables (e.g. number of children, type of school environment), are seen as influencing satisfaction with career, which influences retention in teaching. External and environmental influences and level of human capital attained (e.g. number of education credits, amount of time invested in teaching, continuing education credits, or master's degree) are hypothesized to influence career satisfaction and satisfaction with pay, which directly influence retention in teaching. This is seen as a dynamic model.

Below are listed the variables used in this study and their scales.

Variables and their scales

Background Characteristics

1. SEX: (1=male, 0=female)
2. RACE: (Race1=Hispanic, Race2=American Indian, Race3=Asian, Race4=Black, Race5=White)
3. PARENTED: (Parent Education- SES) (1=less than high school, 2=high school graduate, 3=some college, 4=college graduate, 5=graduate degree)
4. HSGPA: High School Grades (1=D or F, 2=C or C-, 3=C+ or B-, 4=B, 5=B+ or A-, 6=A)
5. MEMBER: of clubs and groups (0=none to 7=high participation)
6. TEACHPLN: Teaching plans, when made (1=before high school to 6=after 1980)
7. Reasons for entering teaching (1=not important, 2=important, 3=very important)
   -REAIMPED: importance of education -REAWKKID:to work with kids -REASALRY: salary
   -REASERVE: to serve others -REAOPPAD: opportunity to advance -REAPREST:prestige

Early Educational Preparation

8. SCIENCESEM: Semesters high school science (range:0-10)
9. MATHSEM: Semesters high school math (range:0 - 10)
10. ACADAPT: Academic aptitude score (range:1 - 8)
11. EDUCCRED: undergraduate education credits (range: 0-85)
12. BSGPA: undergraduate GPA (transcript file) (range:1.67-4.0)
13. MATH/SCI: Math/science major (0=no, 1=yes)
14. MATHCRED: undergraduate math credits (range: 0-59)

Level of Human Capital

15. GEDUCCRED: graduate education credits (range: 0-74)
16. MADEGREE; MA degree received (0=no, 1=yes)
17. FIRSTJOB: First job teaching? (0=no, 1=yes)
18. CERTIFIED: Have permanent certification? (0=no, 1=yes)
19. ACTS: No. of continuing education activities (range: 0 - 10)
20. NOYRSTCH: No. of years in teaching bet. 1976-1985 (range: 1-9)
21. LINCOME: Salary in 1986 (or last year taught, equated to 85-86 levels) (range: $630-$52,000). Income was logged (LN), the logged range was 6.45-12.97.

Environment/External Influences

22. NUMKIDS: No. of children (range: 1=0 - 5=5 or more)
23. SRHS: Taught in a senior high school (0=no, 1=yes)
24. JRHS: Taught in a junior high school (0=no, 1=yes)
25. PUBLICSCH: School type (0=private, 1=public)
26. FULLTIME: Part time/full time (0=part time, 1=full time)
27. ABILSTU: ability level of students in class (range: 1=low to 4=high)
28. MINORITY: percentage of students in classes who are minority (0=0 percent to 5=100 percent)

Career Satisfaction

29. SATISTEAC: how often satisfied with teaching career? (1=almost never -4=all the time)
30. SATISPAY: how satisfied with pay in 1986? (1=low to 5=high)
31. SATISJOB: how satisfied with job held in 1986? (1=low to 5=high)
32. TEACH86: dependent variable: Still teaching in 85-86 school year? (0=no, 1=yes)

FINDINGS

Patterns in Teaching Over Time

Table 1 and figures 1-4 display descriptive information about the career patterns of those who ever taught. Table 1 displays teacher status: the percentage starting, exiting, or currently teaching, by year, from 1977 to 1986. It also displays the net increase or decrease for a) first-time starters and first-time leavers and b) for any starters (including returnees) or leavers. Interestingly, on average, 2.8 percent of the cohort started for a second or third time each year. The average annual attrition rate (for any exit/re-exit) from 1978 to 1986 was 7.1 percent.

The net increase or decrease for first-time starters or leavers is derived by subtracting first left from first start. The net decrease or increase for any starters or leavers is calculated by subtracting any exit or re-exit from any start or restart. The average annual net increase for any starters or leavers from 1978 to 1986 was 1.6 percent. For 4 of the last 5 years (1981-82 to 1984-85), the net increase or decrease for any starters or leavers was generally very low (-1.4 to 0.5). In 1985-86, however, the net increase was 9.6 percent, which is unexpectedly large. This signifies that a much larger percentage of people were entering net of the leavers.

According to Knepper (1989), in the NLS-72 cohort, the average time to complete a bachelor's degree was 4 1/2 years, and only about 47 percent of them were completed within 4 years after high school. Although we know that only about half of these students finished college within 4 years, many of the individuals in the NLS-72 cohort presumably made normal progress to college graduation, and thus graduated in 1976 or 1977. Some of the original group who may have taken longer to start or finish college may make up a portion of those "first starting" in later years. Also some states require a fifth year of college for teacher training, before a person can teach in that state. In addition, although over 95 percent of this group said they received a BA or BS degree, a few (approximately 50) did not.

Out of the original cohort of 1,011, 21 percent (186) never taught. Figure 1 shows the percentage of the remainder (825) teaching in each year from 1976-77 to 1985-86. The overall average percentage teaching per year is 54 percent, ranging from 47 percent in 1976-77 to 66 percent in 1979-80 to 61 percent in 1985-86. Figure 2 shows the percentage first starting teaching by year. Approximately 87 percent of those who taught in this 10-year period started in the first 5 years (1977-81), and the remainder started between 1982 and 1986. Figures 1 and 2 show an increase in percentage teaching from 1984-85 to 1985-86. Figure 3 shows the percentage starting for the first time or restarting in each year. In 1985-86, approximately 6 percent of the cohort entered for the first time and 8 percent restarted, for a total of 14 percent new starts or restarts, a substantial increase over the preceding 5 years.

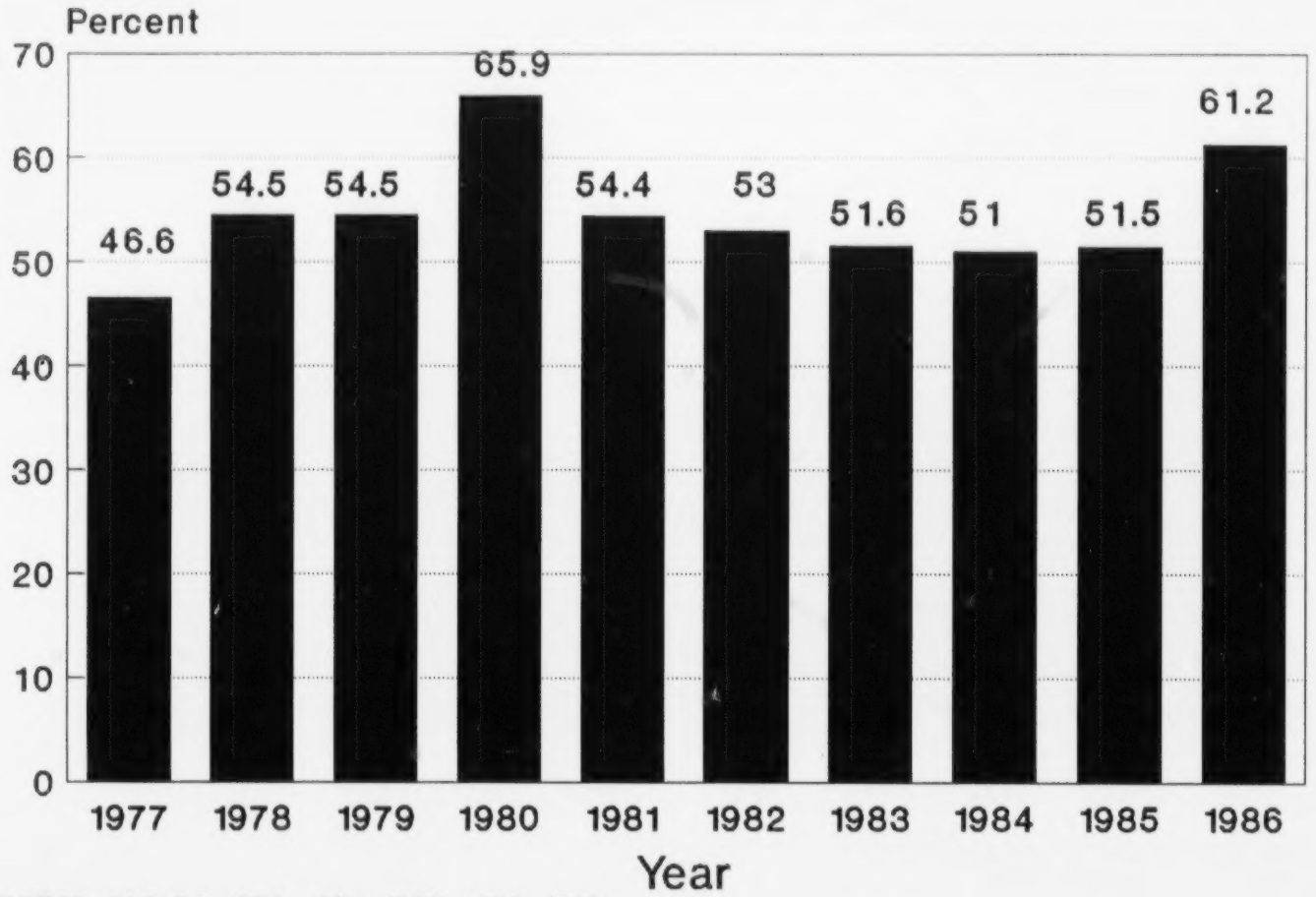
Table 1.--Teacher status--percentage starting, exiting, or currently teaching, by year: 1976-1986

	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	Average % 78-86*
Percent teaching	46.6	54.5	54.5	65.9	54.4	53.0	53.6	51.0	51.5	61.2	55.3
First start	46.6	16.6	6.8	13.0	2.7	2.2	2.4	1.7	1.8	6.2	5.9
Any start/return	46.6	16.6	8.3	17.3	3.7	5.5	4.9	4.2	3.8	14.2	8.7
Return 2nd, 3rd time	0.0	0.0	1.5	4.3	1.0	3.3	2.5	2.5	2.0	8.0	2.8
First left	0.0	8.7	8.3	5.8	14.1	6.3	5.1	3.4	2.4	2.9	6.3
Any exit/reexit	0.0	8.7	8.3	6.0	15.2	6.9	6.3	4.8	3.3	4.6	7.1
Exit 2nd, 4rd time	0.0	0.0	0.0	0.2	1.1	0.6	1.2	1.4	0.9	1.7	0.8
Net increase/decrease first time											
Starters or leavers	46.6	7.9	-1.5	7.2	-11.4	-4.1	-2.7	-1.7	-0.6	3.3	-0.4
Net increase/decrease for any starter of leavers	46.6	7.9	0.0	11.3	-11.5	-1.4	-1.4	-0.6	0.5	9.6	1.6

* 1977-78 school year through 1985-86 school year

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Longitudinal Study of the Class of 1972 (NLS-72).

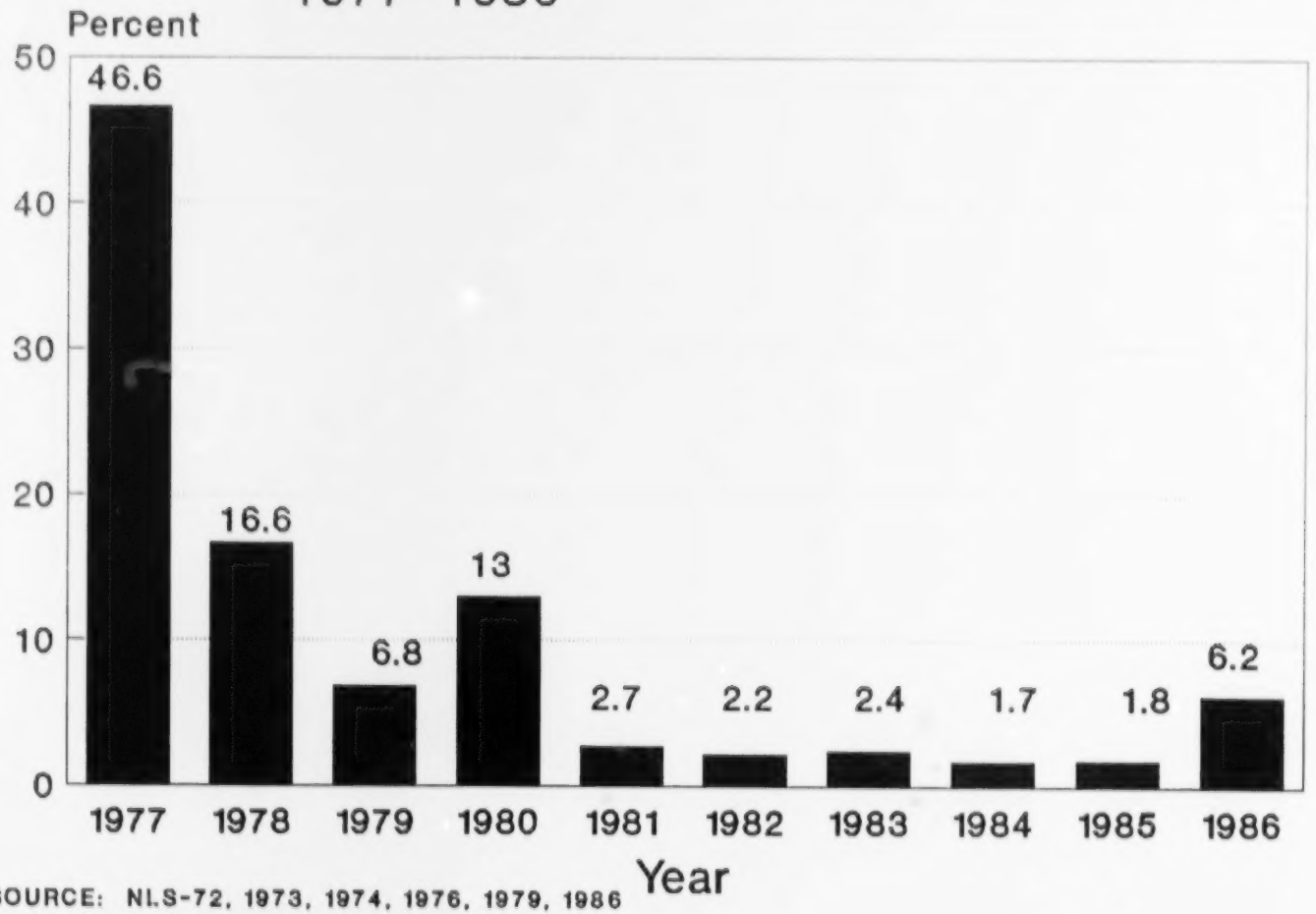
Figure 1.--Percentage teaching, by year: 1977-1986



SOURCE: NLS-72, 1973, 1974, 1976, 1979, 1986

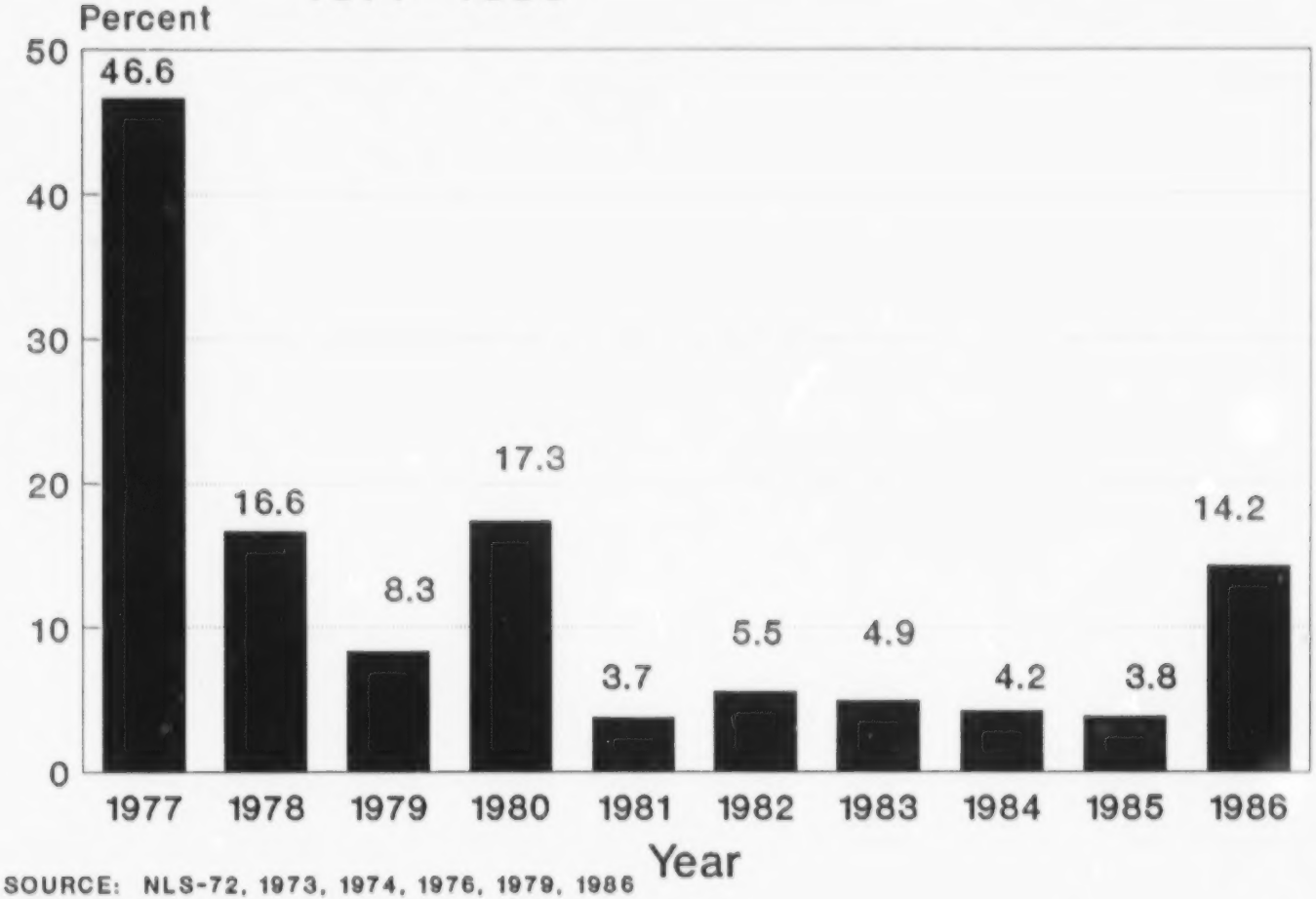
BASE: 1972 HS graduates who ever taught.

Figure 2.--Percentage first starting teaching, by year: 1977-1986



SOURCE: NLS-72, 1973, 1974, 1976, 1979, 1986
BASE: 1972 HS graduates who ever taught.

Figure 3.--Percentage starting or restarting, by year: 1977-1986



SOURCE: NLS-72, 1973, 1974, 1976, 1979, 1986
BASE: 1972 HS graduates who ever taught.

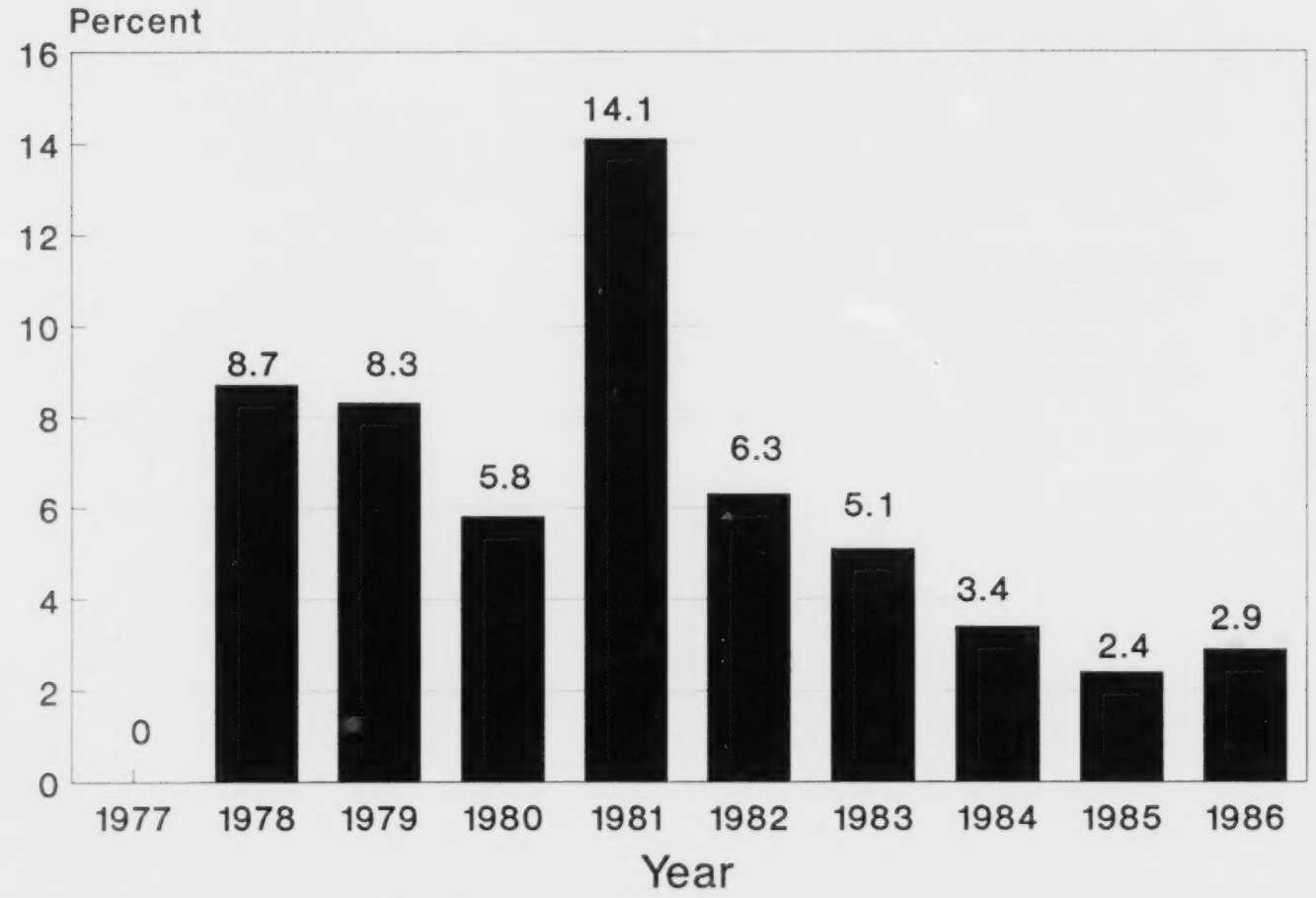
Figure 4 displays the percentage first leaving teaching, by year, for the same period. As shown, the greatest number (about 37 percent) of teachers left in the first 5 years. This may be due partially to teachers who do not achieve full certification. It is consistent with previous evidence on the percentage of new entrants to teaching leaving within 5 years (Mark and Anderson, 1978). Interestingly, a large percentage (14 percent) left in 1980-81, a period, characterized by many involuntary layoffs caused by enrollment declines (Murnane, Singer, and Willette, 1988). After 1981, the percentage leaving declines, with only a slight upturn in 1985-86.

If the 21 percent of the original cohort who never entered teaching are added to the 37 percent who left for the first time in the first 5 years, 58 percent are found either never to have taught or to have left in the first 5 years. This is much greater than the 25 percent rate cited in other studies (Chapman and Hutcheson, 1982, and Mark and Anderson, 1978). It must be kept in mind, though, that many teachers leave teaching for a time and then come back. In fact, 57 percent of the total group who ever taught left teaching at some point. Yet, 61 percent of the original group is still teaching in 1986. In the NLS-72 cohort, the category of "stopouts" or intermittent teachers made up 8 percent of the total group. This group only incorporates those who left teaching for a while but did not hold another position outside of teaching; thus it does not include all the individuals in the reserve pool. Some members of the group moving in and out of teaching most likely are women who leave to get married or start families and return to teaching in later years. The most common reasons cited by this cohort for leaving teaching were starting a family, low teaching salaries, or a strong interest in a different career.

The picture of teaching career patterns drawn here is a consistent, yet fluid one. The percentage of people teaching across a 10-year period is consistently about 50 to 55 percent. Eighty-seven percent of a teaching cohort entered the field within the first 5 years after college graduation, and the remainder entered in small increments over the next 5 years. The largest number of teachers left teaching in the first 5 years after 1976, which was the college graduation date for many of the members of this cohort. After 1980-81, a small number--ranging from 2 to 6 percent--left each year. The average attrition rate across the 10 years for this cohort (for any exit or re-exit) was 7.1 percent.

Although in any given year, on average, 7 percent of the teachers left the profession, a similar percentage entered for the first time or re-entered; thus, an almost constant proportion of the cohort was teaching in each of the 10 years following college graduation. Two exceptions to the general trend were seen in school years 1979-80 and 1985-86, when the proportion teaching increased significantly. An 11 percent increase was seen in the percentage teaching in 1979-80 (from 55 percent in 1978-79 to 66 percent in 1979-80); and a 9 percent upturn was seen in the percentage teaching in 1985-86 (from 52 percent in 1984-85 to 61 percent in 1985-86). An upturn was also seen in the percentage first starting teaching from (approximately 2 percent each year from

Figure 4.--Percentage first leaving teaching, by year: 1977-86



SOURCE: NLS-72, 1973, 1974, 1976, 1979, 1986
BASE: 1972 HS graduates who ever taught

1981 to 1985 to 6 percent in 1985-86). A large increase was seen in the percentage of any start/restart from 1981 to 1985 (from about 4 to 5 percent per year between 1981 and 1985 to 14 percent in 1985-86). In addition, the percentage leaving teaching did not increase over time.

Comparisons of Six Teacher Groups

As previously noted, one problem with current attrition research is the failure to measure and categorize important subgroups of teachers (Grissman and Kirby, 1987). Chapman (1986) has developed a model on teacher retention which uses four groups: those who taught continuously, those who never taught, intermittent teachers, and those who left teaching permanently.

In this study, teachers or potential teachers were categorized by patterns of teaching. In the first stage, identified teachers or potential teachers were categorized as to patterns of teaching. Depending on career patterns exhibited, each teacher was classified into one of six mutually exclusive groups for analysis purposes. Teachers were categorized into groups based on dates of initial employment in teaching, dates of leaving, number of years spent in teaching, and whether or not they were still teaching in 1986. Using a sample of 1011 individuals who were surveyed six times from 1972 to 1986, this paper describes those who 1) are current elementary or secondary school teachers, 2) are former elementary or secondary school teachers, or 3) are qualified to teach but never entered the teaching profession.

The six mutually exclusive groups are the following:

1) STARTED EARLY, STILL TEACHING (n=235)--An individual's first job was teaching and that individual was teaching during the school year 1985-86.

2) STARTED LATE, STILL TEACHING (n=202)--An individual's first job was not teaching and that individual was teaching during the school year 1985-86.

3) STARTED EARLY, NOT TEACHING IN 1985-86 (n=172)--An individual's first job was teaching and that individual was not teaching in 1985-86.

4) STARTED LATE, NOT TEACHING IN 1985-86 (n=128)--An individual's first job was not teaching and that individual was not teaching in 1985-86.

5) STOPOUTS: MOVING IN AND OUT OF TEACHING PROFESSION (n=88)--An individual who began teaching (early or late), left teaching for one or more years, and then re-entered teaching. It should be pointed out that an individual was not classified as a stopout if he/she left teaching for a spell (i.e., maternity) and did not hold another position outside of teaching.

6) QUALIFIED TO TEACH, BUT WHO NEVER ENTERED TEACHING (n=186)--An individual who earned a B.S. degree in teaching and/or was certified to teach, but never entered teaching. These individuals did not have any history of teaching in their job histories reported in the third through fifth followup surveys[4]

Tables 2-4 give additional descriptive information about background characteristics, education (course credits), and job-related characteristics of the six teaching groups. Table 2 shows some important characteristics of the NLS-72 teacher sample, including demographics; education preparation variables; number of children; satisfaction with job, salary, and other variables. Tables 3 and 4 give some demographic and other background characteristics of the teachers. Tables 3.1 and 4.1 (in the Technical Notes section) display the standard errors for tables 3 and 4.

In order to identify variables which best discriminate among the six teacher groups, a discriminant analysis was performed. Variables included number of semesters of science and math in high school, undergraduate GPA, college math credits, academic aptitude score, number of graduate education credits, number of children in 1986, satisfaction with pay, satisfaction with job and salary in 1986.

Using the discriminant procedure, two functions were identified (see table 5). The first function seems to be made up of a low number of education credits, high satisfaction with pay, high academic aptitude score, and low BSGPA. The second function is related to high salary, low academic aptitude, and having no children or few children.

Table 6 shows the discriminant functions at group means. In order to attempt a meaningful interpretation of the two dimensions for the six teacher groups, the six group means on the discriminating functions are examined. A rectangular coordinate system is used to represent the dimensions, even though the axes representing the discriminant functions are probably not orthogonal.

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[4]See Technical Notes for detailed description of development of teaching pattern variable.

Table 2. Characteristics of NLS:72 teacher sample

73% were female
87% were white
8% were black
2% were Hispanic

73% had A or B grades in high school
70% had two or more years of high school science
44% had 3 or more years of high school math
70% had six or more undergraduate education courses
77% had more than 2 undergraduate math or science courses
5% had a BA or BS degree in math, science or engineering
72% were certified
18% earned a postgraduate degree

In 1985-86 school year (or last year taught):
57% taught elementary school
20% taught junior high school
22% taught high school
84% taught full time
82% taught in public school

In 1985:
68% were satisfied or very satisfied with their pay
90% were satisfied or very satisfied with their job
70% were satisfied with teaching most or all of the time
74% were married
37% had no children
21% had one child
41% had 2 or more children

The average full time salary in 1985-86 was $21,280

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Longitudinal Study of the High School Class of 1972 (NLS-72).

Table 3.--Percentage of individuals in six teaching groups who were trained for or who entered the teaching profession between the years 1977-86, by selected background characteristics

	Start early, teach 1986	Start late, teach 1986	Start early, not teach 1986	Start late not teach 1986	Stopouts: intermittent	Qualify: never teach	Unweighted n
Total percent	24	17	19	12	8	21	1011
Background characteristics							
Sex							
Male	17	18	17	11	7	30	273
Female	26	16	19	13	9	17	738
Teacher race/ethnicity							
Hispanic	16	45	12	13	1	13	25
Black	25	27	10	14	4	20	83
White	24	16	20	12	8	21	884
Highest parent education							
Left high school	18	31	11	12	8	20	110
HS graduate	26	14	21	12	8	20	292
Some college	30	15	15	15	9	17	253
B.S. Degree	22	18	21	13	11	15	175
Graduate degree	15	15	22	9	6	33	174
High school grades							
C & D	48	11	13	14	1	14	52
B & C	17	19	20	15	7	21	154
Mostly B	23	20	20	9	6	23	228
A & B	22	15	18	13	8	25	307
Mostly A	22	17	22	11	12	16	202
Aptitude score during high school							
Lower 33%	30	17	17	11	7	18	332
Middle 33%	22	20	20	13	10	15	340
Upper 33%	18	14	20	12	7	29	324
HS activities							
None	20	16	15	16	10	23	115
1-2 Activities	18	18	19	12	8	25	467
3-4 Activities	34	16	19	9	8	15	297
5 or More	20	18	23	14	6	20	67
When decided to teach							
Before high school	34	13	17	10	8	18	242
During high school	25	13	23	12	8	20	347
Fst2 college	26	17	18	13	7	19	206
Lst2 college	11	19	22	10	12	26	116
After B. S.	10	47	10	15	13	6	72
Semesters of HS science							
0-2	24	20	17	13	8	17	274
3-4	21	18	20	13	10	17	395
5-6	26	13	18	9	6	28	237
7 or more	20	13	21	16	5	24	52
Semesters of HS math							
0-2	16	26	17	11	12	18	195
3-4	27	18	19	13	5	18	349
5-6	23	13	19	11	8	25	352
7 or more	24	8	20	14	11	22	71

SOURCE: NLS-72
NOTE: Rows do not sum to 100 because of rounding.

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Table 4.--Percentage of individuals in six teaching groups who were trained for or who entered the teaching profession between the years 1977-86, by selected job-related characteristics, average number of years taught, and average salary 1986

	Start early, teach 1986t	Start late, Teach 1986	Start early, not teach 1986	Start late not teach 1986	Stopouts: intermittent	Qualify: never teach	Unweighted N
Total percent	24	17	19	12	8	21	1011
Characteristics of last school taught							
Level of school taught							
Elementary	36	22	20	9	12	0	415
Junior high	34	21	21	15	9	0	149
High school senior	22	23	26	17	11	0	163
Type of school last taught							
Public	36	23	20	11	9	0	609
Private	14	16	32	17	20	0	133
Ability of class taught							
Low ability	42	23	17	8	10	0	159
Medium	30	22	23	14	11	0	518
High ability	25	23	28	9	15	0	64
Percent of class minority							
None	37	18	24	10	11	0	118
1-40 percent	30	20	26	13	11	0	383
41-90 percent	37	20	19	14	10	0	135
91-100 percent	26	38	12	10	14	0	74
SES status of class taught							
Low SES	45	21	19	6	8	0	141
Low middle	26	24	27	14	10	0	267
Mixed	41	18	14	14	13	0	135
Upper middle	23	23	27	14	13	0	184
Certification							
Yes	30	18	18	9	10	16	704
No	8	15	20	17	5	35	285
Earned M.S./M.A.							
M.S degree	33	18	15	7	8	19	270
No M.S.	20	15	21	13	9	22	660

Table 4.--Percentage of individuals in six teaching groups who were trained for or who entered the teaching profession between the years 1977-86, by selected job-related characteristics, average number of years taught, and average salary 1986--Continued

	Start early, teach 1986	Start late, teach 1986	Start early, not teach 1986	Start late Not teach 1986	Stopouts: intermittent	Qualify: never teach	Unweighted N
Total percent	24	17	19	12	8	21	1011
Continuing educ activities							
None	8	14	36	37	5	0	136
1-2 activities	22	20	28	13	16	0	193
3-4 activities	33	22	22	13	10	0	252
5-6 activities	44	23	16	8	9	0	167
7 or more	42	27	14	7	10	0	77
Work experience							
Satisfaction with pay in last job							
Very dissatisfied	22	30	15	12	7	14	65
Dissatisfied	34	19	17	9	10	10	238
Satisfied	24	14	17	11	8	25	519
Very satisfied	11	17	23	18	7	25	134
Satisfaction with last job							
Very dissatisfied	10	3	16	33	6	32	21
Dissatisfied	16	16	15	15	8	30	80
Satisfied	28	17	18	12	9	16	620
Very satisfied	19	18	19	9	7	28	246
Number of children as of 1986							
No children	29	15	16	10	9	21	377
One child	25	23	13	13	7	19	212
Two children	18	14	26	14	6	22	291
Three or more	18	17	20	12	13	20	126
Average number Years taught	8	5	4	3	6	0	825
Average salary 1986							
All	$19,554 (n=207)	$18,428 (n=159)	$18,542 (n=165)	$17,092 (n=88)	$17,341 (n=82)	$25,489 (n=162)	
Full-time only	$20,255 (n=188)	$19,483 (n=142)	$19,294 (n=137)	$18,852 (n=68)	$19,538 (n=64)	$27,136 (n=144)	

Source: U.S. Department of Education, National Center for Education Statistics, National Longitudinal Study of the High School Class of 1972 (NLS-72).

Table 5.--Standardized canonical discriminant coefficients

	Function1	Function2
Science courses	0.054	0.191
Math courses	-0.031	-0.120
Bsgpa	-0.451	0.061
College math credits	0.009	-0.113
Academic aptitude	0.533	-0.380
Grad. Educ. Credits	-0.667	-0.030
Salary 1986	0.323	0.915
Number kids	0.244	-0.307
Satisfaction pay	0.466	-0.311
Satisfaction job	-0.235	0.190

Table 6.--Structure matrix: Correlations between discriminating variables and canonical discriminant functions

	Function1	Function2
Grad Educ. Credits	-0.604	0.030
Satisfaction pay	0.378	-0.110
Academic aptitude	0.277	-0.242
Salary 1986	0.324	0.823
Science courses	0.118	-0.034
BSGPA	-0.213	-0.038
Math courses	0.126	0.083
College math credits	0.096	-0.048
Number kids	0.208	-0.248
Satisfaction job	-0.073	0.117

Canonical discriminant functions at group means

Group	Function1	Function2
1 Early, Teaching	-0.560	0.227
2 Late, Teaching	-0.123	0.067
3 Early, Not Teach	-0.009	-0.230
4 Late, Not Teach	0.221	-0.666
5 Intermittent	-0.245	-0.178
6 Never Taught	.756	0.281

The group means are shown on figure 5, the territorial map. The first function is represented by the horizontal axis and the second function by the vertical axis. The map outlines the general territory of each group and signifies group means as asterisks. If necessary the map can be combined with an all-groups plot in order to identify misclassified cases (those not falling within the outline boundaries on the territorial map). The axes are the discriminant scores calculated from the first two discriminant functions extracted.

Primary discrimination on the first function was between those who never taught (group 6 - positive) and those who started early and were still teaching (group 1 - negative). Group 4 (started late, not teaching) was similar on this dimension to group 6, and group 5 was similar to group 1. Groups 2 (started late, still teaching), and 3 (started early, not teaching) were very similar to each other in the center of the scale on this dimension. Those who never taught tended to have a low number of education credits, low BSGPAs, high academic aptitude, and high satisfaction with pay. Those who started teaching as their first career and were still teaching tended to have a high number of education credits, high BSGPA, low academic aptitude, and low satisfaction with pay. Group 5 (intermittent teachers) was similar to group 1 on this function.

On the second function, primary discrimination was between groups 1 and 6 (started early, now teaching, and never taught), and group 4 (started late, not teaching). Those in groups 1 and 6 tended to have higher salaries in 1986, and few children. By contrast, those in group 4 and, to a lesser extent, groups 3 and 5 tended to have lower salaries and more children (two or more).

Group 4 is made up of those who first started in another career after college, taught for a period, and then left teaching. Because of the higher turnover rate of this group, it appears to lose out in salary. The relationship between number of children and salary is unclear, although group 4 may be made up of woman who left teaching to raise children. Group 1 clearly has the advantage of starting early (first job out of college) and has reaped the monetary benefits of spending a longer time in the field. Group 6 (never taught) is slightly higher in salary level than group 1, however.

Retention in Teaching

Regression analysis found that graduate education credits, number of children, satisfaction with pay, and satisfaction with job were significant predictors of retention in teaching. Table 7 displays the parameters of the regression model for the percentage of teachers still teaching in 1985-86. The dependent variable in this analysis is whether or not the individual is still teaching in 1985-86 (the latest year for which data exist for this cohort). Some random variation may exist in factors predicting teaching in 1986 vs. predicting teaching in 1985, it is likely to be small.

Figure 5.--Territorial Map

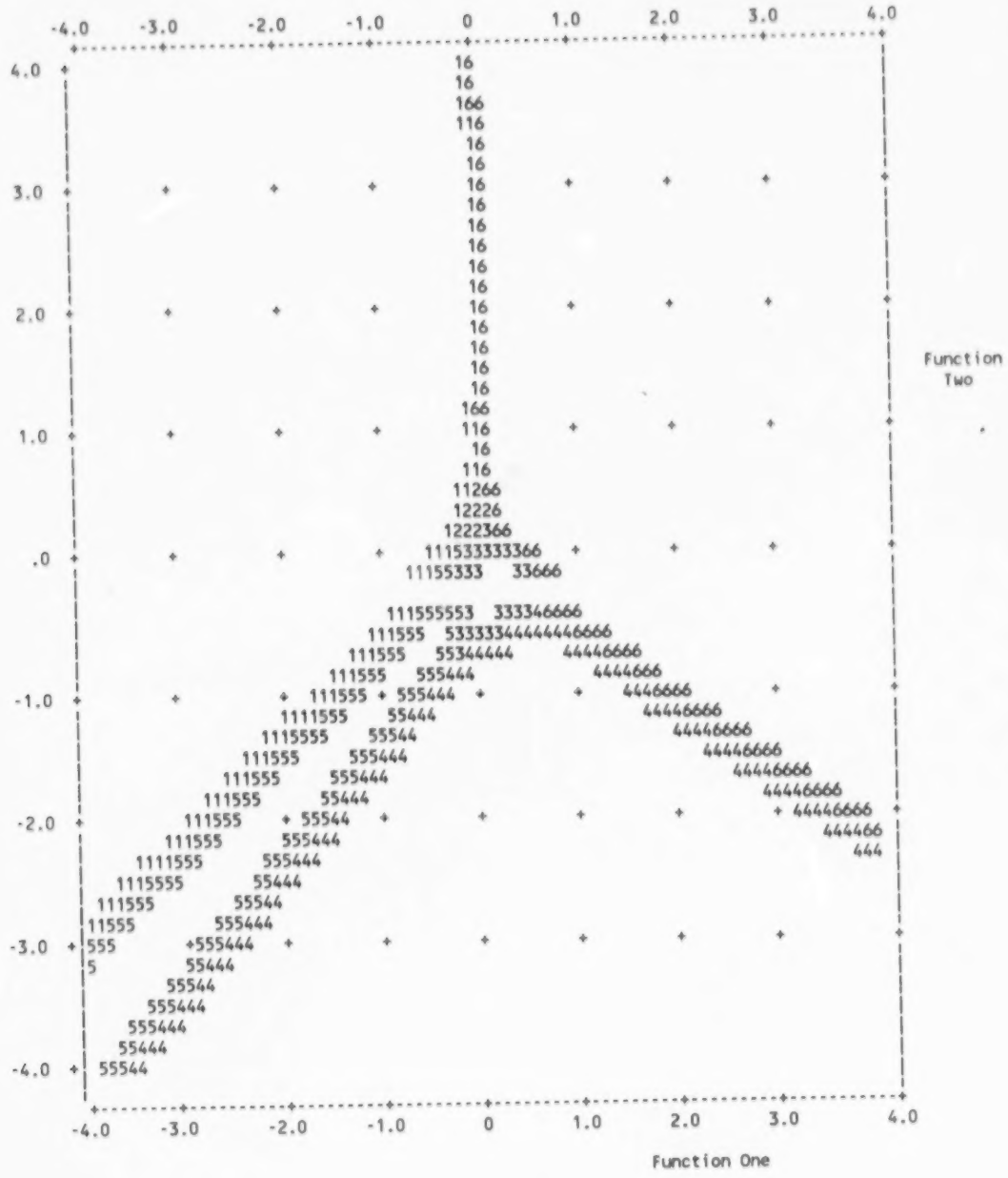

Table 7.--Regression model predicting retention in teaching

	-------Full Model-------					----------Reduced Model-----			
Variables	beta	wls b	wls se	BRR se	t	DEFT	wls b	wls se	t
INTERCEPT	0.00	0.02							
MALE	.01	0.012	0.04	.053	.24	1.25	-	-	
HISPANIC	.03	0.15	0.11	.155	.94	1.41	-	-	
BLACK	.01	0.04	0.07	.126	.32	1.80	-	-	
PARENTED	-.12	-0.03	0.01	.011	-2.73***	1.10	-.02	.01	-2.0**
HSGPA	-.10	-0.02	0.01	.035	-.57	3.50	-	-	
SEMSCIENC	-.03	-0.004	0.01	.025	-.16	2.5	-	-	
SEMMATH	.04	0.01	0.01	.018	.56	1.80	-	-	
APTITUDE	-.04	-0.01	0.01	.016	-.63	1.60	-	-	
MEMBER	.10	0.03	0.01	.019	1.58	1.90	-	-	
TEACHPLAN	.05	0.01	0.01	.02	0.50	2.00	-	-	
REASIMPED	-.18	-0.06	0.02	.06	-1.00	3.00	-	-	
REASSALRY	.10	0.04	0.03	.057	.70	1.90	-	-	
REASOPPAD	-.05	-0.02	0.03	.06	-.33	2.00	-	-	
REASPREST	-.02	-0.01	0.03	.05	-.20	1.67	-	-	
REASSERVE	.10	0.03	0.03	.046	.65	1.53	-	-	
REASWKKID	.01	0.003	0.03	.08	.04	2.67	-	-	
BSGPA	-.05	-0.01	0.02	.07	-.14	3.50	-	-	
MATH/SCIE	.02	0.06	0.07	.057	1.05	.81	-	-	
MATHCREDT	-.04	-0.00	0.00	.004	-.75	1.33	-	-	
MADEGREE	.06	0.08	0.04	.09	.89	2.25	-	-	
EDUCCRED	.15	0.003	0.00	.0015	2.00**	1.50	.003	.001	2.0**
GEDUCCRED	.03	0.001	0.00	.002	.50	2.00	-	-	
CERTIFIED	.01	0.01	0.04	.05	.20	1.16	-	-	
FIRSTJOB	-.17	-0.15	0.04	.05	-3.00***	1.25	-.15	.035	-3.43***
LINCOME	-.10	-0.01	0.01	.13	-.08	13.00	-	-	
NUMKIDS	-.13	-0.04	0.01	.019	-2.11**	1.90	-.04	.01	-2.00**
NOYRSTCH	.47	0.06	0.01	.014	4.29***	1.40	.06	.01	4.30***
FULLTIME	.18	0.07	0.04	.099	.71	2.50	-	-	
PUBLICSCH	.23	0.18	0.04	.09	2.00**	2.25	.18	.037	2.25**
JRHS	.001	0.01	0.05	.07	.14	1.40	-	-	
SRHS	-.06	-0.09	0.05	.07	-1.29	1.40	-	-	
ABILSTUD	-.001	-0.00	0.02	.054	0	2.70	-	-	
MINORITY%	-.02	-0.01	0.01	.019	.53	1.90	-	-	
ACTS	.14	0.025	0.01	.015	1.67*	1.50	.03	.008	2.5**
SATISPAY	-.25	-0.05	0.01	.017	-2.94***	1.70	-.05	.01	-2.9***
SATISJOB	.29	0.05	0.02	.03	1.67*	1.50	.06	.01	4.0***
SATISTEAC	.16	0.04	0.02	.075	.53	3.75	-	-	-
R SQUARE	.66			Aver.DEFT	2.18		RSQUARE		.63

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Longitudinal Studies of the Class of 1972.

Legend: *=p<.10, **=p<.05, ***=P<.0l

NOTE: See figure 1 for variable definitions.

The model is fairly well explained (R-Square = .66 in full model, .63 in reduced model). In the reduced model, only parent education, number of education credits, teaching as a first job, number of children, number of years spent in teaching, teaching in a public school, number of continuing education activities, satisfaction with pay and with job were significant (see table 7). The following variables fell out of the full model as nonsignificant: sex, race, high school GPA, semesters of math and science, aptitude test score, member of clubs, teaching plans, various reasons for entering teaching, math or science major, college GPA, math credits, master's degree, graduate education credits, certified or not, log of income in 1986, teaching full time, taught in junior high or high school, ability level of students taught, percent of minorities in student body, and satisfaction with teaching.

Only one background variable significantly predicted retention in teaching: parental education level. Having parents with low educational attainment predicted retention in teaching. Several human capital variables significantly predicted retention. In the academic preparation area, only number of undergraduate education credits positively predicted retention. Number of continuing education activities positively predicted retention, as did number of years in teaching. Teaching as a person's first job, however, predicted low probability of retention.

In the area of environment/external influences, the number of children a person had was a significant negative predictor--the greater number of children, the less likely to be still teaching. A large predictor of persistence was school type; teachers who taught in public schools were more likely to be still teaching in 1986.

In the area of career satisfaction, general satisfaction with last teaching job held positively predicted retention in teaching, but satisfaction with pay in last job held was a negative predictor. In other words, the more satisfied one was with pay in 1986, the more likely to have left teaching. Thus, the positive predictors of retention were: low parental education, number of education credits, number of years in teaching, teaching in a public school, number of continuing education activities (e.g. courses, workshops), teaching not one's first job out of college, no children or few children, low satisfaction with pay on last teaching job, and high satisfaction with last job.

Interestingly, high school grades, academic aptitude, and college grades were not strong predictors. The correlations between these variables and retention in teaching were negative but not high. Those with high academic aptitude were not more likely to leave teaching (the variable was not significant in the multivariate regression analysis), and math and science majors and those with high math and science credits were not significantly more likely to have left. Salary was not a significant predictor of retention, although it must be kept in mind that all of these individuals were about the same age. Thus, the range in salary was probably not as wide as it would be in a group of individuals with a variety of ages and years of experience. Satisfaction with pay was a

significant predictor, as was teaching in a public school. In a related correlation analysis, income level was significantly positively related (at the $p < .05$ level) to teaching full time, teaching in a public school, having a master's degree, having permanent certification, and being male.

SUMMARY AND CONCLUSIONS

To conclude, on average, 55 percent of this teacher cohort were teaching each year in a 10-year period. Twenty-one percent of the cohort never entered teaching and 37 percent left within the first 5 years (1977-1981). However, many individuals moved in and out and back into teaching. Although the average attrition rate over a 10-year period was found to be 7 percent, the average annual net increase for any starters or leavers for the period was 1.6 percent. A 9 percent upturn was seen in 1985-86 in the percentage teaching--61 percent, compared with a stable 52-53 percent between 1981 and 1985. An upturn was also seen in the net increase for starters in 1985-86 (up 10 percent), compared with an average 1 percent net decrease for any starters or leavers between 1981-82 and 1984-85. Although a lot of mobility is evident in these teachers' careers, the percentage of teachers leaving the field does not seem to be increasing, and attrition seems to be very low or nonexistent.

Economic and human capital variables were found to play a large part in predicting retention in teaching. However, the best predictors were primarily human capital variables: number of years in teaching, satisfaction with job, teaching in a public school, number of continuing education activities, and number of education credits.

Those still teaching are clearly different on several important variables, compared to former teachers and those who never taught. In regard to the issue of teacher quality, the discriminant analysis showed that, in contrast to Chapman's (1986) results, academic aptitude and achievement (BSGPA) were related to career patterns. As documented extensively in other studies, individuals no longer teaching and those who never taught had higher academic aptitude scores than those still teaching. Individuals who never taught had the highest aptitude scores. Groups 1 and 2 (still teaching) had a high number of education credits, high BSGPA's, low academic aptitude scores, and low satisfaction with pay.

It should be kept in mind that GPA in college is highly related to courses taken and field of study, and that grades are relatively high in education and social sciences, compared to math and science, for example (Astin, 1977). It would be interesting to carry out a similar discriminant analysis using BSMAJOR as a grouping variable to try to disentangle these effects.

Although a teacher shortage may exist in certain metropolitan areas or in certain fields, in 1986 almost two-thirds (61 percent) of the cohort from the high school class of 1972 who were trained to teach appeared to be still in teaching, and there was no evidence that a greater number were leaving the field than in previous years. The percentage teaching and the percentage entering or re-entering increased in 1985-86, compared to earlier years. Since satisfaction with pay was found to be a significant predictor of retention in the regression analysis, thus confirming previous research, maintaining adequate salary levels is an evident priority issue in the retention of

teachers. Satisfaction with pay was a significant *negative* predictor of retention, so those who are satisfied with their salary in 1986 are more likely to have *left* teaching.

According to a 1988 Metropolitan Life report, teachers' salaries have increased substantially over the past few years, and this recent upturn is possibly in response to the much-publicized increase. For example, the proportion earning more than $30,000 a year from teaching doubled from 1985 to 1988 (from 13 percent to 26 percent) (Louis Harris & Associates, 1988). It appears that the reserve pool, at least in this young cohort, may be responsive to economic incentives.

Murnane's human capital model of cost-benefit analysis can be of great use in explaining why certain teachers stay in the field. Quite simply, teachers, like most people, respond to economic incentives. Teachers who invest a large amount of time in teaching--take many education courses, workshops, and continuing education activities and are relatively satisfied with their jobs--are more likely to stay in teaching and to be still teaching in 1986. In addition, their salary is likely to be higher than that of teachers who have taught but left for another field, or that of intermittent teachers (see table 4 to compare annual salaries of six teaching groups).

It should be kept in mind that the period 1976-1986 was one characterized by a low attrition rate and (after 1982) by steadily increasing salaries. It appears that young cohorts and possibly the reserve pool may be responsive to economic incentives.

The importance of number of education credits and continuing education activities in predicting retention suggests that relaxing course and degree requirements to increase the supply of teachers may be disadvantageous. Such new people may be more likely to leave teaching, since they do not have as much invested in their careers as do more traditionally trained teachers.

Results lend some support for Chapman's social learning theory model. Social and environmental variables found to be important in predicting retention were parental education, number of children, teaching in a public school, and satisfaction with job. However, environmental work conditions such as teaching full time, teaching in a junior or senior high school, student ability level, and percent minority of student body were not significant predictors of retention.

Chapman's focus on family formation factors was supported. The fact that having no children or few children was a predictor of retention in teaching was a not an unexpected finding, although the implications are unclear. In this study, those currently teaching had fewer children than those who left teaching or intermittent teachers. It is unclear whether giving birth to a child or having children under school age in the home influences leaving teaching. Examining these influences would be of interest in future studies. Murnane (1988) shows evidence that women generally have shorter first spells of teaching than men, but longer second spells.

Alsalam and Hafner (1990), in looking at the same NLS-72 cohort, found that wages, opportunity costs, and other economic incentives were stronger influences than family formation on duration in teaching. They found that the birth of a child was not an important predictor of women's duration in teaching; neither was the number of preschool children in the family. Interestingly, women teachers with preschool children had longer first teaching spells than others. Marriage was not generally found to be an important predictor of duration with one exception--females who were married were more likely to have shorter first spells in teaching, perhaps because the relative economic incentive became less salient. Alsalam and Hafner found that, holding other variables constant, women do not have shorter spells in teaching than men. Males were found to have longer first spells in teaching, but re-enter teaching at a lower rate than females. Females had longer second spells. As teachers' salaries have been seen to rise in recent years and as the relative economic incentive rises, married women and those with children may be more likely to re-enter teaching.

Results of this study point to the often-heard recommendation that teaching should be made more "professional" like other professions such as accounting and nursing. By doing so, individuals are more likely to have a larger investment in their careers and to persist longer in the field. This may also keep the quality of human capital in the field high. Some recent activities such as creating the National Board for Professional Teaching Standards appear to be a movement in this direction. Policy makers may need to realize more the importance of wages, to focus on investing in the teaching career for females, and to advertise the flexibility of the career for women who wish to get married or have children.

TECHNICAL NOTES

The NLS-72 Survey and Sample

The study uses longitudinal data from base year (1972) and five followups, between 1972 and 1986, of the National Longitudinal Study of 1972 (NLS-72). The original number of respondents in 1972 was 19,000. The fifth followup sample in 1986 was an unequal probability subsample of those students who participated in at least one of the five previous waves of NLS-72. Approximately 12,917 people from the 1972 cohort responded to the fifth followup survey. In the NLS fifth followup, various subgroups, including current or former teachers and persons with backgrounds in math, science, and engineering were drawn into the sample with certainty.

As part of the National Longitudinal Survey of the High School Class of 1972 (NLS-72), a Teaching Supplement questionnaire was sent to all respondents to the fifth followup survey who indicated they had teaching experience or had been trained for teaching at the elementary/secondary level (n = 1442). In addition, persons with math, science, or engineering backgrounds (those with 2-year, 4-year or graduate degrees in those fields), were drawn into the sample with certainty. Approximately 302 of the fifth followup individuals who were mailed the teaching supplement were non-responders; 1,038 questionnaires were returned complete questionnaires, and 102 returned questionnaires indicating no teaching experience, degree in education, or certification to teach.

From the sample of 1038 individuals reported in the Teacher Survey Supplement, 27 were deleted in this analysis because of missing or inconsistent data that made classification very difficult. This resulted in a total of 1011. The responses of other individuals were changed if inconsistencies were evident between self-reported current teaching status (FT1) and job histories reported in third through fifth followup surveys. Decisions as to correct classification were made on a case-by-case basis.

Because NLS-72 is a longitudinal survey, the database includes extensive personal history data going back to 1972. This history includes high school experiences and achievements, postsecondary education, family formation patterns, work experiences, earnings and income, and selected attitudes and values. Hence, teaching supplemental data on 1,038 cases can be merged with prior waves of the survey for analyses of antecedent conditions and events that may have influenced respondents' career decisions.

Weighting of Observations and Standard Errors

The weight for the fifth followup participants (FU5WT) was used in all analyses. The weights used to adjust the sample data are proportional to the inverse of the

retention probabilities through all stages of the sample selection process. They are adjusted to reflect nonresponse within the sampling strata.

The use of weighted data results in more accurate estimates by adjusting for any disproportionate representation of particular groups imposed by the clustered sampling design. The sampling probability for the teaching supplement was the same as the sampling probability for inclusion in the fifth followup sample. This weight theoretically projects to the 239,000 high school seniors of 1972 who either went into teaching or who were trained for teaching but never taught.

The regression analyses presented here were computed using PROC REG of the Statistical Analysis System (SAS, 1982). Although all models were based on the use of FU5WT, the resulting standard error estimates were biased. Bias is due to the disproportionate stratified sample design of NLS-72. SAS PROC REG uses simple random sample techniques for computing standard errors. Simple random sample techniques bias the estimates of standard errors when the sample formulas underestimate the variance and standard errors of statistics. To adjust for the loss of efficiency between the study design and a simple random sample, the standard errors of the regression coefficients (**b's**) were multiplied by the square root of the design effect (DEFT). For the full model, the standard errors were calculated using balanced repeated replication (BRR) procedures (Wise, L., 1983). The design effect for each predictor in the full regression model was the ratio of the BRR estimate and the weighted least squares (PROC REG) estimate. The **t** is calculated by dividing the weighted least squares **b** by the weighted least squares standard error multiplied by the DEFT.

On the regression table (table 7), "**wls**" designates weighted least squares estimates and "BRR" designates the BRR adjusted estimates. "DEFT" is the design effect for each variable: the ratio of the BRR standard error estimates and the wls standard error estimate. For the reduced model, the design effects derived in the first regression were used to calculate the **t** values.

Procedures

Using data from the National Longitudinal Study of the High School Class of 1972, individuals who were either qualified to enter teaching or who entered teaching at the elementary or secondary level during the period 1976 to 1986 were subsetted to a working data file. Selected variables were taken from the base-year (1972) through fifth followup (1986) surveys and from the high school and college transcript files. This file was merged with the Teaching Supplement data file, which contains specific information on those individuals who were involved with teaching at the elementary or secondary school levels.

This study utilized the 1038 individuals who were identified in the Fifth Follow-up Teacher Supplement codebook as being 1) current elementary or secondary school teachers, 2) former elementary or secondary school teachers, or 3) qualified to teach but never entered the teaching profession. To confirm present and past teaching status, this data was merged with occupation-specific data from the third through fifth followup surveys. Each individual was classified as being either a teacher or a nonteacher for the months of September and April for each year from 1976 through 1986. The following classification scheme was used:

An individual identified each of his/her occupations (jobs held in 1976, 1977 through 1986) as being: 1) elementary school teacher (census code 142), 2) pre-kindergarten or kindergarten teacher (census code 143), 3) secondary school teacher (census code 144), or 4) teacher, except college or university (census code 145). This analysis did not classify as teachers those individuals who reported the following occupations:

1) Librarians (code 032)
2) Therapists (code 076)
3) College and university teachers (codes 102-140)
4) Vocational and education counselors (code 174)
5) School administrators, elementary and secondary (code 240)
6) Teacher aides (code 382)

For each individual on the file, a companion variable was also created that classified each individual as being in a nonteaching occupation for each September and April for the period 1976-1986. This variable was used in conjunction with the above "in teaching variables" to create the teacher status variables that would indicate spells of employment in the teaching profession from 1976 to 1986. It was also used to develop a count variable that indicated the total number of years that an individual taught between 1976 and 1986.

Using the above "in teaching" and "other nonteaching occupation" status variables for each year from 1976 to 1986, each individual who entered the teaching profession was classified as being an "early" or "late" starter. If the first occupation an individual entered during the period was teaching, that individual was classified an early starter, regardless of B.S. or B.A. completion date. An individual who first entered a nonteaching occupation before entering teaching was classified a late starter. Also, an individual who held a nonteaching job in September of a given school year and a teaching job in April of that same school year was classified a teacher for that school year.

In the second through fourth stages of analysis, descriptive statistics were developed on a) background and educational experiences, b) postsecondary education

course-taking behavior, c) career patterns of teachers, including percentage entering and leaving each year; d) self-perceived teaching qualifications, teaching experiences, attitudes toward teaching, perceptions as to the rewards of teaching, and satisfaction. In the fifth stage, a discriminant analysis was run to look at differences among groups and a regression analysis was run to ascertain which factors predict retention in the teaching field.

Significance Tests

In general, only coefficients with a probability of .05 or smaller are considered to be statistically different from zero, and in this regression analysis a probability value of .05 is used in the reduced model. The variables are entered all at once in the regression analysis, as all of the variables were hypothesized to influence retention in teaching.

Item and Variable Definitions

The NLS-72 database incorporates a base year questionnaire and cognitive tests (1972) and five followup questionnaires administered between 1972 and 1986. In addition, high school and college transcript files are available for the NLS-72 participants. The items used and their scales of measurement are presented above, on page 8. For those who remained in teaching, information on 1985-1986 annual salary variable was available from the teacher questionnaire. For the remainder, the salaries they would have earned had they stayed in teaching were estimated in accordance with procedures that follow. (Since the teachers came from all over the United States, it was not possible to access salary schedules, by districts.)

Salary schedules were assumed to have remained relatively constant or to have increased at about the rate of inflation for the years 1976-1986. First, then, the Consumer Price Index (CPI) was used to equate the individual's salary in the last year taught with 1986 salary levels. However, when these results were compared with the salaries of those who had remained in teaching, CPI was seen to be an underadjustment.

The next step, therefore, was to calculate the average rate of increase for teachers who had taught continuously and apply that rate to the salary earned in the individual's last year of teaching. This appeared to be an adequate adjustment. For those who never taught, 1985-86 salary information was obtained from the NLS-72 fifth followup questionnaire.

An academic aptitude score was calculated for all individuals. The majority of people had either an SAT or ACT score, which was converted to a scale developed by Astin (1977). SAT/ACT scores are put on an equivalent academic aptitude scale which ranges between 1 and 11. An equivalency scale between those academic aptitude scores

and high school grade point average was subsequently developed. For those individuals who did not have ACT/SAT data, the academic aptitude scores corresponding to their HSGPA was imputed. Since so few had academic aptitude scores above 7, levels 8 through 11 were collapsed, for a 1 to 8 range.

Of the three satisfaction variables, only person who ever taught answered the question regarding satisfaction with teaching. The question read: "During the current 1985-86 school year (or the last year that you taught), how much of the time do (did) you feel satisfied with your teaching job?" The scale was 1 = almost never to 4 = all the time. Two additional questions were asked of all NLS-72 fifth followup respondents (given in 1986): how satisfied were they with their job held in 1986 and how satisfied were they with their pay.

However, different types of individuals (e.g. males vs. females, black vs. whites) may differ in their definitions of "satisfaction" with pay and work. The level of income required for satisfication probably varies. To one, for example, $40,000 an year could be an astronomical amount of money; to another it could mean a minimal standard of living. These variables are not absolute, but relative to the individual.

Discriminant Analysis

Intercorrelations of the independent variables used in the discriminant analysis were generally low to moderate, thus multicollinearity is not a problem. Univariate statistics were run on the variables. All showed fairly normal distributions. Since all six groups should have equal covariance matrices, a Box's M test was run. Box's M was 292.2, not significant at $p > .58$. Thus, the covariance matrices are equal. The results of univariate F tests on all 10 independent variables showed that only graduate education credits, salary, and satisfaction with pay were significant at $p < .05$ or less.

Two discriminant functions were significant, with the first eigenvalue (.213) accounting for 59 percent of the variance, and the second (.09) accounting for 25 percent of the variance.

Regression Analysis

The major technique used in this paper is weighted least squares regression (wls). The dependent variable is dichotomous (teaching in 1986 or not). Logistic regression is not used, as it is generally agreed that if the distribution of "1's" falls in the range of 20-80 percent, ordinary least squares (OLS), weighted least squares (WLS) and logistic regression results are equivalent (Goodman, 1978; and Markus 1979). In addition, the results of OLS regression are much more straightforward to interpret, so that method

was used here. Approximately 60 percent of those who were trained to teach and ever started were still teaching in 1986.

Multiple regression analysis is used to ascertain the unique and combined influence of background characteristics, early educational preparation, level of human capital, environment/external influences, and career satisfaction variables on retention in teaching. Only individuals who had taught at least 1 year were used in the regression analysis, which is performed in order to determine whether or not a particular independent variable is a significant predictor, when the other independent variables are held constant. The analysis also is a means of assessing how much of the total variation in teacher retention can be accounted for by all these teacher variables.

The regression model was estimated using a base group for comparisons with dummy variables (0-1 predictors). For sex, the base group was females; for race/ethnicity, the base group was whites; for math/science major the base group was other majors; for teaching as first job, the base group was those whose first job was not teaching; for certification, the base group was those not certified; for school level, the base group was elementary school teachers; for school type, the base group was private schools; and for full-time teaching, the base group was part-time teachers. By using these base groups, the effects of various predictors can be inferred by comparing group means over time and across groups. According to Kanouse et al (1980), such effects "can be estimated for a particular individual by comparing changes between the individual's outcome measures with estimates for the expected changes for individuals in a suitably chosen control group with similar background characteristics" (1980, p. 30).

The effects of various background characteristics are seen as deviations from the pattern for similar individuals in a base or control group. Hence, parameter estimates (raw coefficients, not betas) indicate the difference between the predictor variable and the base group (e.g. between blacks and whites) when other independent variables are held constant. "Holding constant" involves statistical control, not experimental control. By holding variables constant, one can separate out the effects of a single independent variable, free of influences of other independent variables. This slope is a partial slope or partial regression coefficient (Lewis-Beck, 1980).

The remainder of the variables are on interval level scales. The **b** in this case indicates the average change in the dependent variable (y) associated with a unit change in that independent variable, x. For example, the analysis showed that for each year increase in the number of years spent in teaching, a person would be 6 percent more likely to be teaching in 1986. Because there are so many variables on different scales, the standardized estimates are also provided in the regression table. Beta weights or standardized partial slope estimates indicate the average standard deviation change in a dependent variable associated with a standard deviation change in an independent variable, when other independent variables are held constant. Betas provide a useful way to compare relative contributions of variables based on different units of

measurement. Betas can be used to assess the relative influence of variables as predictors of teacher retention. Thus, relative to other betas, the larger the coefficient, the stronger is its power in predicting retention. Positive coefficients indicate that the higher categories of a variable are associated with retention. For example, the greater number of continuing education activities ACTS, the more likely one is to remain in teaching (beta = .14). A negative coefficient indicates that the higher categories of a variable are associated with leaving teaching. For example, the higher the satisfaction with one's pay in 1986, the more likely one is to be not teaching (beta = -.25).

Accuracy of Estimates

The estimates presented in the tables are based on a sample and are subject to sampling variability. Caution should be exercised in interpreting statistics based on relatively small numbers of cases as well as in interpreting small differences between estimates. If the questionnaires had been sent to different samples, the responses would not have been identical; some numbers might have been higher, others lower. The standard errors in the tables provide indications of the accuracy of each estimate. If all possible samples of the same size were surveyed under identical conditions, a range of plus or minus one standard error around the estimate would include the "true" population value of the variable in about two-thirds of the cases; a range of plus or minus two standard errors would include the population value about 95 percent of the time. Note, however, that the standard errors in the tables do not take into account the effects of biases due to nonresponse, measurement error, processing error, or other systematic error that could occur even in a complete (universe) survey.

For More Information

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STANDARD ERRORS

Table 3.1.--Standard errors for percentage of individuals in six teaching groups who were trained for or who entered the teaching profession between the years 1977-86, by selected background characteristics

	Start early, teach 1986	Start late, teach 1986	Start early, not teach 1986	Start late not teach 1986	Stopouts: intermittent	Qualify: never teach	Unweighted n
Total	2.2	1.4	1.5	1.2	1.0	1.6	1011
			STANDARD ERRORS				
Background characteristics							
Sex							
Male	2.9	3.0	2.8	2.2	1.7	7.2	273
Female	2.7	1.6	1.6	1.3	1.2	1.6	738
Teacher race/ethnicity							
Hispanic	7.4	11.1	6.6	6.0	1.4	8.6	25
Black	5.5	6.0	3.8	4.7	1.8	4.7	83
White	2.4	1.5	1.6	1.3	1.0	2.9	884
Highest parent education							
LT high school	4.1	5.0	3.1	3.6	2.6	4.4	110
HS graduate	2.8	2.3	2.6	1.9	1.8	2.7	292
Some college	6.1	2.6	2.6	2.6	2.0	2.9	253
B.S. degree	3.3	3.3	3.3	3.4	2.7	2.8	175
Grad degree	3.7	3.7	4.5	2.4	2.0	10.3	174
High school grades							
C & D	15.5	4.7	5.6	6.1	1.1	5.8	52
B & C	3.3	3.5	3.8	3.4	2.3	3.9	154
Mostly B	3.0	3.2	2.8	2.0	1.7	3.3	228
A & B	3.1	2.7	2.8	2.4	1.8	7.0	307
Mostly A	3.3	3.0	3.2	2.4	2.7	2.9	202
Aptitude score during high school							
Lower 33%	5.1	2.4	2.4	1.9	1.5	2.6	332
Middle 33%	2.4	2.6	2.4	2.0	1.8	2.1	340
Upper 33%	2.7	2.2	2.9	2.2	1.6	6.2	324
HS activities							
Home	4.0	4.4	3.5	3.8	3.3	4.3	115
1-2 Activities	2.2	2.1	2.3	1.8	1.4	4.9	467
3-4 Activities	5.3	2.6	2.8	1.9	1.8	2.4	297
5 or More	5.0	5.3	5.8	4.6	3.0	6.2	67
When decided to teach							
Before high school	5.9	2.5	2.8	2.2	2.0	2.9	242
During high school	2.4	2.1	2.6	1.9	1.4	2.5	347
FST2 college	3.6	3.1	3.0	2.9	1.9	3.0	206
LST2 college	3.1	3.9	4.5	2.9	3.6	4.7	116
After H. S.	3.9	6.6	3.3	4.2	4.4	3.1	72
Semesters of HS science							
0-2	5.7	3.1	2.6	2.3	1.9	2.8	274
3-4	2.3	2.3	2.2	1.9	1.7	2.1	395
5-6	4.2	2.6	3.3	2.2	1.7	8.2	237
7 or more	7.7	3.9	7.5	5.1	2.8	6.7	52
Semesters of HS math							
0-2	2.6	3.9	2.9	2.5	2.8	3.1	195
3-4	4.8	2.4	2.4	2.1	1.3	2.5	349
5-6	3.0	2.2	2.7	2.0	1.6	6.2	352
7 or more	5.6	2.9	5.5	4.5	3.7	5.5	71

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Longitudinal Studies of the High School Class of 1972.

Table 4.1.--Standard errors for percentage of individuals in six teaching groups who were trained for or who entered the teaching profession between the years 1977-86, by selected job-related characteristics--Continued

	Start early, teach 1986	Start late, teach 1986	Start early, not teach 1986	Start late not teach 1986	Stopouts: intermittent	Qualify: never teach	Unweighted n
Total	2.2	1.4	1.5	1.2	1.0	2.6	1011
			STANDARD ERRORS				
Characteristics of last school taught							
Level of school taught							
Elementary	4.0	2.6	2.3	1.6	1.8	0.0	415
Junior high	4.5	3.8	3.5	3.3	2.9	0.0	149
High sch senior	3.5	3.6	3.7	3.3	2.7	0.0	163
Type of school last taught							
Public	3.0	2.2	1.8	1.5	1.3	0.3	609
Private	3.2	3.8	4.4	3.3	3.9	0.0	133
Ability of class taught							
Low ability	7.7	4.7	3.4	2.4	2.8	0.0	159
Medium	2.3	2.1	1.9	1.7	1.5	0.0	518
High ability	5.7	6.1	6.6	4.3	4.6	0.0	64
Percent of class minority							
None	4.8	3.8	4.3	3.1	3.2	0.0	118
1-40 percent	2.5	2.3	2.5	1.8	1.9	0.0	383
41-90 percent	10.0	4.8	4.0	3.9	3.2	0.0	135
91-100 percent	6.1	7.1	4.5	3.6	4.1	0.0	74
SES status of class taught							
Low SES	8.8	5.0	4.1	2.4	2.7	0.0	141
Low middle	2.8	3.0	2.8	2.2	2.2	0.0	267
Mixed	4.6	3.8	3.2	3.3	3.1	0.0	135
Upper middle	3.3	3.5	3.7	2.8	2.7	0.0	184
Education experience							
Years taught for those who entered teaching	8	5	4	3	6	0	825
Certification status							
Yes	2.9	1.7	1.8	1.2	1.3	3.6	704
No	1.8	2.4	2.6	2.4	1.3	3.2	285
Earned M.S./M.A.							
M.S. degree	4.5	2.8	2.8	1.8	1.9	8.0	270
No M.S.	2.9	1.7	1.8	1.5	1.2	2.0	660
Continuing educ activities							
None	2.8	3.3	4.6	4.5	2.0	0.0	136
1-2 Activities	3.3	3.5	3.4	2.8	3.0	0.0	193
3-4 Activities	3.3	3.1	2.9	2.2	2.3	0.0	252
5-6 Activities	7.4	4.3	3.4	2.3	2.4	0.0	167
7 or More	6.3	5.5	5.3	2.9	3.5	0.0	77
Work experience							
Statisfaction with pay in last job							
Very dissatisfied	5.5	7.2	4.5	4.6	4.0	4.5	65
Dissatified	3.6	2.8	2.6	2.0	2.4	2.1	238
Statisfied	3.6	1.9	2.0	1.6	1.4	4.5	519
Very satisfied	2.9	3.7	4.2	3.5	2.2	4.4	134

Table 4.1.--Standard errors for percentage of individuals in six teaching groups who were trained for or who entered the teaching profession between the years 1977-86, by selected job-related characteristics

	Start Early, Teach 1986	Start Late, Teach 1986	Start Early, Not Teach 1986	Start Late Not Teach 1986	Stopouts: Intermittent	Qualify: Never teach	Unweighted n
Statisfaction with last job							
Very dissatisfied	7.1	3.2	7.8	11.3	6.1	10.4	21
Dissatified	4.7	4.1	4.1	4.3	3.7	5.8	80
Statisfied	3.1	1.9	1.8	1.5	1.3	1.7	620
very satified	3.3	3.3	3.3	2.1	1.7	8.2	246
Salary 86							
All	$674 (n=207)	$649 (n=159)	$500 (n=165)	$781 (n=88)	$907 (n=82)	$1,916 (n=162)	
Fulltime only	$762 (n=188)	$593 (n=142)	$430 (n=137)	$716 (n=68)	$782 (n=64)	$1,860 (n=144)	
Family formation							
Member of children as of 1986							
No children	4.3	2.1	2.2	1.7	1.7	2.6	377
One child	3.2	3.5	2.4	2.6	1.8	3.0	212
Two child	2.8	2.4	3.7	2.6	1.5	7.5	291
3 or more	3.7	3.7	3.8	3.1	3.7	3.9	126

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Longitudinal Studies of the High School Class of 1972.

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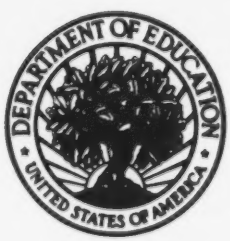

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